ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies	)	ET Docket NO. 92-9

COMMENTS OF
COMMUNICATIONS SATELLITE CORPORATION

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SUMMARY

COMSAT supports the Commission's initiative to create emerging technologies bands in the 1850-2200 MHz segment of the spectrum, and urges the Commission to proceed immediately to implement its proposals in the NPRM. As an initial step, COMSAT believes the Commission should allocate the bands 1970-2010 MHz (E-to-S) and 2160-2200 MHz (S-to-E) to the MSS as agreed at WARC-92.

As we demonstrate in our Comments, it is possible for MSS to share effectively with the remaining inhabitants of the proposed emerging technologies band. Broadcast Auxiliary service, used primarily for ENG, can share with MSS if certain guidelines are followed to minimize interference. Sharing is facilitated by the fact that only one of the seven channels available for ENG in this band overlaps the WARC-92 MSS allocations. As an alternative to sharing, the Commission should also consider not assigning the overlap channel to ENG in the future. For the Multipoint Distribution Service, where only 2 MHz of the 12 MHz allocation overlaps the MSS allocation in Region 2, we show that sharing is feasible under practical scenarios.

Our sharing analyses also indicate that it is feasible for MSS and fixed services to both operate within portions of the 2 GHz band during the transition period, e.g., 10 years, before the fixed facilities are fully relocated to other bands. Thus, COMSAT believes that the Commission could implement MSS in the

proposed 2 GHz bands in the near future -- 1996-1998 time frame -- with little adverse impact on other services. Given the lead time to design, construct, and launch satellites with new technology in these bands, the Commission should proceed to allocate these bands in 1992 as the first phase of action in this proceeding.

COMSAT also believes that the Commission should explore the feasibility of using a portion of the 1710-1850 MHz band, which is currently allocated for government services, as a future home for private and common carrier fixed services. Any such consideration, however, should in no way delay action in this proceeding. Other higher frequency bands at 4 and 6 GHz should be able to accommodate the necessary relocation. In this regard, any financial arrangements between new occupants and incumbents in the 1850-2200 MHz band should be purely ad hoc and voluntary and take place only where necessary to alleviate interference situations.

At this stage of development of terrestrial PCS, or FPLMTS, COMSAT believes that the space and terrestrial components should have separate allocations. Our assessment herein shows that limitations necessary for effective sharing between space and terrestrial applications could produce a negative economic impact on the terrestrial development.

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Communications Satellite Corporation (COMSAT), through its COMSAT Mobile Communications division, hereby submits the following comments in response to the Commission's Notice of Proposed Rulemaking in ET Docket No. 92-9 regarding the reallocation of the band 1.85-2.2 GHz for use by emerging telecommunications technologies.[1] COMSAT endorses and commends the Commission's efforts to utilize this spectrum for the development of new telecommunications services -- including advanced mobile-satellite services made available through the application of emerging satellite technologies. Through our INMARSAT-3 satellites, Standard M and B terminals, and Project 21 program, COMSAT will continue to be a leader in the development of new and innovative satellite technology which will greatly expand the availability of mobile-satellite services to a full range of users. These innovations and new services, however,

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[1] See Redevelopment of Spectrum to Encourage Innovation in the Use of New Telecommunications Technologies, 7 FCC Rcd 1542 (1992) (NPRM).

require sufficient amounts of spectrum to support their implementation. COMSAT believes that the band the Commission has proposed in its NPRM is well suited to accomplish this end.

I. INTRODUCTION

The Commission's initiative to establish emerging technologies bands in the 1850-2200 MHz segment of the spectrum reflects the type of forward looking leadership necessary if the radio frequency spectrum is to be planned and managed effectively. COMSAT believes that the comprehensive approach outlined in the Commission's rulemaking can and should be implemented within an early time frame. Indeed, the particular blocks of frequencies allocated to the Mobile-Satellite Services (MSS) at WARC-92 must be implemented quickly in order to accommodate the relatively long lead times associated with the design, construction, and launch of satellites incorporating these bands.

Spectrum studies conducted by COMSAT, other industry participants, the CCIR, and the U.S. Government in preparation for the WARC-92 conference, evidence that the Commission has selected the most appropriate spectrum to make available for emerging mobile and satellite technologies. COMSAT agrees with the Commission's choice of evaluative factors to select the proposed band segment and believes that 1850-2200 MHz band fully

satisfies these criteria. Indeed, the agreement reached at WARC-92 places the key global bands for MSS, as well as some of the regionally allocated bands, squarely within this band.[2] These agreements in the WARC-92 Final Acts mean, of course, that the other ITU member countries have also selected these bands for a worldwide allocation to MSS.[3]

Thus, the Commission's proposal to accommodate emerging technology for mobile and mobile satellite services in the spectrum between 1850-2200 MHz is consistent with U.S. decisions at WARC-92. The instant rulemaking provides the first opportunity for the Commission to follow-up on the decisions at WARC-92 and to take immediate action to implement the new MSS

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[2] WARC-92 allocated the bands 1980-2010 MHz (uplink) and 2170-2200 MHz (downlink) as global bands. The band 1970-1980 MHZ (uplink) and 2160-2170 MHz (downlink) was allocated within Region 2 for the Americas.

[3] Although the specific bands agreed to at WARC-92 for MSS were not the ones the United States initially proposed, they were put forward and strongly supported by the U.S. Delegation (USDEL) at the conference as compromise bands. The USDEL entered a footnote to the International Table of frequency allocations in the Final Acts announcing that these bands for MSS would become available in the United States by the year 1996. This action was taken in view of another footnote to the Table indicating that these bands would not be generally available on a worldwide basis before the year 2005. The USDEL, by taking this action, emphasized the urgent need to make additional bands available for MSS at the earliest possible date.

bands.[4] The need to proceed with new MSS allocations argues in favor of adopting a phased spectrum implementation approach.[5] Under such an approach, the Commission could allocate the bands 1970-2010 MHz (E-to-S) and 2160-2200 MHz (S-to-E) to MSS for use beginning in 1996 and implement a transition plan to relocate some existing operations with minimal disruption to service.[6] As illustrated in Figure 1, the spectrum overlap between the services slotted to remain in the proposed 2 GHz allocation, Broadcast Auxiliary and Multipoint Distribution Service, and the WARC-92 MSS bands is really quite modest.

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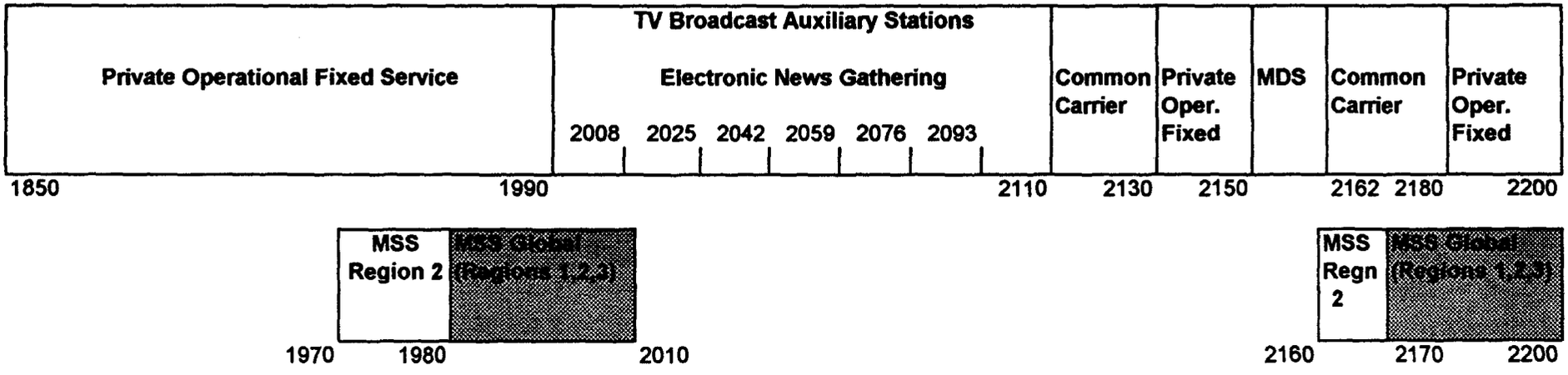
[4] We assume that the Commission will issue a Rulemaking that will focus specifically on implementing the overall results of WARC-92. Actions taken in the subject rulemaking to ready the 1850-2200 MHz band for new services will complement and should help expedite actions to implement the results of WARC-92.

[5] See NPRM, 7 FCC Rcd at 1546.

[6] As we explain in detail in Appendix A, it is feasible for MSS, broadcast auxiliary service (e.g. Electronic News Gathering) MDS and fixed (microwave) services to share parts of the same frequency bands under certain scenarios. Meanwhile, as the Commission takes action to reaccommodate the 2 GHz fixed services within the United States to other bands, other countries will not necessarily take such actions in the same time frame. It becomes important, therefore, to plan MSS operating scenarios for these global bands that are compatible with terrestrial fixed services in the near term during the transition period. In the longer term of 10 years, the fixed microwave operations should be fully accommodated in other bands, or moved to fiber cable non-radio facilities.

Figure 1

U.S. Terrestrial Spectrum Allocations vs WARC-92 New Mobile Satellite Service Allocations



II. THE SPECTRUM AT 2 GHz IS NEEDED TO SUPPORT NEW MSS TECHNOLOGY

At WARC-92, the world telecommunications community officially addressed the need of MSS for additional spectrum to support existing as well as future services.[7] While there was near universal agreement on the need for a substantial amount of new MSS spectrum, there was considerable debate during the Conference about the specific bands that should be allocated to MSS. However, the Conference finally reached consensus on the following allocations: primary MSS in the 1980-2010 MHz (E-to-S), 2170-2200 MHz (S-to-E) worldwide, plus 10 MHz of adjacent MSS spectrum allocated only in Region 2 in the 1970-1980/2160-2170 MHz in the 2 GHz bands. These allocations were in addition to others for MSS in the RDSS bands at 1610-1626.5 MHz and 2483.5-2500 MHz, MSS in 1492-1525 MHz (S-to-E) and 1675-1710 MHz (E-to-S), Region 2 only, and a pair of 20 MHz MSS bands 2500-2520 MHz (S-to-E), 2670-2690 MHz (E-to-S), plus a footnote allocation for

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[7] In the official United Stated Proposals to WARC-92, the U.S. recognized the need for additional spectrum for MSS. "The demand for additional spectrum for the mobile-satellite service is growing. The CCIR recognized this situation and estimated the spectrum requirements of these services. Our proposals exceed the minimum amount projected by CCIR." With regard to worldwide allocations, the U.S. proposed 40 MHz of spectrum in each direction for MSS. Thus, the results of WARC-92 are consistent with U.S. projections for additional MSS spectrum. See United States Proposals for the 1992 World Administrative Radio Conference for Dealing with Frequency Allocations in Certain Parts of the Spectrum, United States Department of State, July 1991, at 4-5.

15 MHz of MSS at 2520-2535 MHz (S-to-E), 2655-2670 MHz (E-to-S).[8]

While WARC-92 allocated a grand total of 255 MHz of MSS spectrum, only the worldwide allocations, i.e., the RDSS/MSS bands, and a portion of the 2 GHz MSS allocations, are suitable for global services as offered by INMARSAT. For example the Commission has indicated, that it will not allocate the 2.5-2.69 GHz bands to MSS in the U.S. due to the conflict with MMDS and ITFS microwave Television links.[9] That leaves only two global bands: the matched up and down bands at 2 GHz (1980-2010 and 2170-2200 MHz) and the matched up and down band shared with RDSS (1610-1626.5 and 2483.5-2500 MHz).

In our view, the RDSS bands are not particularly suited for future MSS needs. The lower of the RDSS bands shares with the GLONASS aeronautical navigation satellite system. At the insistence of the Russian Federation, WARC-92 adopted very restrictive EIRP density limits to protect GLONASS, i.e., -3 dBW/4 KHz where there is no overlap with GLONASS, and to -15 dBW/4 KHz in the part of the band used by GLONASS. These limits allow few choices for the system designer of an MSS system

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[8] The bands 1492-1525, 1675-1710, and 2500-2690 MHz may not be available for MSS within the USA due to other service priorities.

[9] See NPRM, 7 FCC Rcd at 1545-1546.

operating in the RDSS band. To comply with these restrictions, a system must either confine itself to 10 MHz of the band to avoid overlap with GLONASS or employ a wider band system operating within the GLONASS band with much lower uplink power densities to conform with the -15 dBW/4 KHz provision. This is only practical with spread spectrum/CDMA modulation/multiple access. Furthermore, it is not clear at present how the number of LEO/MSS systems proposing to operate in the RDSS band will share the spectrum--especially in view of the bi-directional transmissions Motorola's IRIDIUM system proposes to use.

Thus, COMSAT believes that the 30 MHz worldwide MSS allocations at 2 GHz are the most practical bands available to accommodate growth for mobile satellite services, including existing INMARSAT services and the future INMARSAT-4/Project 21 system.[10] Given the commitment the U.S. has already made at WARC-92 to allocate additional spectrum to MSS, COMSAT believes that the Commission should ensure that any use of the 2 GHz band for emerging technologies is consistent with this commitment. As an initial step, COMSAT recommends that the Commission allocate the bands 1970-2010 MHz and 2160-2200 MHz to MSS as agreed to at

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[10] One major impediment to development of the 2 GHz bands is the footnote 746X stipulation that MSS shall not commence before 1 January 2005. A U.S. footnote indicates a 1996 availability date. At the appropriate juncture, the U.S. may also be able to influence the international ITU environment to secure an earlier availability date for MSS 2 GHz bands -- such as the date the U.S. has indicated.

WARC-92.

III. EMERGING SATELLITE TECHNOLOGY AND NEW SERVICES THAT DEMAND ADDITIONAL SPECTRUM

The INMARSAT system is currently in a state of dynamic change and will likely develop even more dramatically in the near-term than it has over the last 12 years. With advances in satellite technology and mobile earth station applications, COMSAT is continuing to find ways of providing high-quality yet lower cost service.

A. Advanced INMARSAT Satellites and Digital Services

INMARSAT has just completed the successful launch of its fourth INMARSAT-2 spacecraft, which now permits the operation of four satellites globally, including two in the Atlantic Ocean Region (AOR). Work continues on the construction of the INMARSAT-3 series satellites, with the first launch scheduled for late 1994. While both the INMARSAT-2 and INMARSAT-3 satellites are designed to operate in the 1.5/1.6 GHz "L"-band MSS allocations, the INMARSAT-3 is the first satellite built to INMARSAT's specifications which will utilize the entire 34 MHz spectrum now available in the 1.5/1.6 GHz bands, including the new 5 MHz segment at 1525-1530 MHz allocated at WARC-92 to be added to the existing downlink band at 1530-1559 MHz. The INMARSAT-3 also employs five spot beams in addition to the traditional global beam coverage offered by INMARSAT on

predecessor satellites. Flexible power reassignment among the beams will enable the INMARSAT-3 satellites to reuse and share frequencies, thereby making more efficient use of the limited spectrum resource. Such flexibility will enhance INMARSAT's ability to share MSS spectrum with other MSS systems.[11] This combination of global and spot beam coverage with agile power reassignment will also allow the INMARSAT system to continue to provide service to users with larger antennas while at the same time offer an array of cost-effective new services relying upon advanced terminal technology.

In parallel with the INMARSAT-2 and INMARSAT-3 satellites, COMSAT and INMARSAT have been working to develop and implement a new generation of digital systems using advanced terminals -- Standard M and Standard B terminals -- to replace and augment the older analogue Standard A equipment. The Standard M system combines relatively lightweight mobile earth stations with enhanced spectrum efficiency to produce high quality low cost satellite communications services for end-users. The Standard M system is designed to provide voice quality and low-speed data and facsimile services to large new markets for land-mobile, land transportable, and maritime applications. Services to these markets will include direct-dial telephony interconnection with

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[11] See, e.g., Comments of Communications Satellite Corporation, File Nos. 20-DSS-MP/ML-92, 21-DSS-EXT-92, March 13, 1992 at 6-7.

the PSTN (including distress priority assignment in the event of emergency situations), direct dial and auto answer Group 3 facsimile interconnected with the PSTN, circuit switched duplex data via the PSTN or public switched data network, and group call services, which allow a single transmission to be received by many users belonging to assigned groups. Moreover, for the land-mobile user, several manufacturers, including several leading U.S. firms, are also developing compact forms of the Standard M terminal. These versions can be briefcase packaged and are adapted to a wide variety of innovative "flat" antennas which, for example, could be used on the lids of briefcases or rooftops of automobiles. Standard M systems will thus address new land-mobile and maritime markets which are constrained by equipment size and costs.

The Standard B system is intended as the successor to the existing INMARSAT A system for the provision of mainstream communications services into the next century with flexibility and capacity for future traffic growth and evolution of user communications requirements. Standard B will meet the demands of an ever expanding user community with a cost effective all digital design that ensures long-term compatibility with existing and new generation spacecraft, i.e., INMARSAT-2 and INMARSAT-3 spot beam satellites, and developing terrestrial facilities including data networks and ISDN.

These new terminal types will realize their full capabilities when the INMARSAT-3 satellites are launched and in service. For example, the Standard B frequency synthesizers are being built to incorporate the new 5 MHz tuning range at 1525-1530 allocated at WARC-92. Moreover, Standard M terminals will radiate with far lower uplink EIRPs than the predecessor Standard A, requiring only 10 KHz of RF spectrum per voice channel instead of 30-50 KHz. These terminals have substantially less massive, smaller antenna structures, yet still provide adequate gain (12-13 dBi) and azimuthal directivity to facilitate frequency coordination with other MSS satellite networks. Use of spot beams on the INMARSAT-3 will further reduce the per carrier uplink EIRP requirements, because of improved G/T on the new satellite.

COMSAT is also working to develop innovative ways to serve the aeronautical mobile-satellite user, one of the newest service sectors. Aircraft terminals are now operating in limited numbers on commercial airliners primarily for data services. In fact, COMSAT was among the first INMARSAT Signatories to offer operational aeronautical data services. Newer widebody jets and business jets are also offering digital voice with a high-gain antenna installation, which tracks the satellite using a sophisticated inertial reference from the aircraft navigation system. In the very near future, COMSAT will be expanding its aeronautical offerings to include facsimile, secure voice and

data, and ground-to-air delivery of teletext services such as news reports.

In order for COMSAT to continue its efforts in bringing new, lower cost services to the market, sufficient additional spectrum must be available to mobile-satellite service providers. COMSAT believes that these innovative programs merit inclusion in any emerging technologies bands to serve the expanding needs of the mobile users.

B. Future Services Using Advanced Technology

INMARSAT announced over a year ago a commitment to evolve the global system into a more innovative and flexible system, including mobile terminals the size of personal hand-held units. This concept is known as Project 21. Through its project 21 program, INMARSAT Signatories such as COMSAT are exploring ways to serve the immense global market for portable mobile communications which has been nurtured by the spectacular growth in cellular systems.

Even at this early stage in COMSAT's research, it is already evident that there are a number of different system configurations to choose from to satisfy the basic requirements of the Project 21/INMARSAT-4 satellite. The initial spacecraft design studies have focused on parallel development of both LEO (or intermediate inclined orbit) and GSO satellite

constellations. For GSO, very large aperture antennas are being proposed for the satellite that would have been impractical a few years ago. In either case, the INMARSAT-4 satellite would employ multiple spot beams to provide for even greater frequency reuse -- 4 to 7 times -- than is available with the INMARSAT-3s.[12] The increase in frequency reuse means that the INMARSAT-4 satellite would be capable of supporting a substantially larger channel capacity, thereby increasing the number of users it can serve.

Through the Project 21 system, COMSAT will be able to provide many of the same services currently offered -- but to small personal communications units. Voice, messaging, and paging are but a few of the communications services that will be available via this new system. The system would also support a broad array of value added service to both handheld and regular mobile terminal users.

IV. SHARING BETWEEN MOBILE AND FIXED OPERATIONS IN THE 2 GHZ BANDS IS FEASIBLE

In the NPRM and OET Report[13], the Commission studied three

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[12] COMSAT as U.S. Signatory to INMARSAT intends to keep open through the Project 21 effort the option of leasing capacity from another entity.

[13] "Creating New Technology Bands for Emerging Telecommunications Technology," Report OET/TS 91-1, Dec. 1991 (OET Report).

categories of uses in the 1850-2200 MHz bands: 1) general fixed services operations; 2) broadcast auxiliary fixed and mobile use; and 3) Multipoint Distribution Service (MDS). The study found that the 2 GHz fixed common carrier and private microwave services were the primary candidates for relocation to other bands. The OET Report also found that relocation of broadcast auxiliary and MDS operations should not be pursued at this time. Thus, COMSAT examined the feasibility of MSS sharing with TV Broadcast Auxiliary Stations, (i.e., Electronic News Gathering (ENG) and, to studio transmitter links,) and Multipoint Distribution Services. As explained in detail in Appendix A, we conclude, based on our initial assessment, that techniques are available to facilitate the introduction of MSS in the portion of the 2 GHz bands used by Broadcast Auxiliary services and MDS with proper coordination of sharing criteria.

A. Localized Mobile Earth Station Interference Into Broadcast Auxiliary ENG Receiving Stations

Under Part 74 of the Commission's Rules, 47 C.F.R. Part 74, TV Broadcast Auxiliary Stations are assigned two channels which would wholly or partially overlap the new WARC-92 MSS uplinks: 1990-2008 MHz and 2008-2025 MHz. (See Figure 1, Section I supra) COMSAT has analyzed the MSS mobile terminal uplink interference into ENG studio receiving stations. From data we obtained on the characteristics of ENG equipment and transmission parameters and the interference analyses shown in Appendix A, it appears that interference between ENG mobile-to-studio links from a

transmitting MSS mobile terminal is manageable.

Thus, the worst case interference from relatively high power mobile terminals, such as Standard M, would be acceptable to ENG with small azimuthal (10 to 15° off the ENG receive antenna axis) and quite modest geographic separations of about 20 km between the mobile terminals and the ENG receive sites. There is one condition, however. The MSS terminals operating in these close quarters must minimize degradation of the received ENG video transmission by avoiding the most sensitive frequencies of the FM/TV signal. In the transitional period, when MSS satellites are first introduced in these bands, transponders will be lightly loaded. This will facilitate using the frequency agility of the mobile terminals to minimize interference into ENG links. Outside of these sensitive regions of the ENG TV transmission spectra, a barely perceptible 1 dB degradation to the video signal-to-noise ratio is achievable with very modest carrier-to-noise ratios (C/Is) (10 to 15 dB). In a later time frame, when satellites are operating at higher loadings, MSS mobile terminals might transmit at frequencies closer to the video carrier -- which would cause perceptible degradation in TV picture quality. In this case, the mobile terminals would have to maintain greater separation distance from the ENG receiver sites. COMSAT envisions that MSS mobile terminals could switch from the satellite communication mode to a terrestrial/cellular mode when operating in urban areas.

B. ENG Transmitter Interference With MSS Uplinks

COMSAT has also analyzed the potential for interference from ENG mobile vans to MSS GSO satellite receivers. Our analysis indicates that sharing may be feasible with certain constraints placed on the ENG transmitters. First, ENG TV/FM transmit stations should not transmit an unmodulated TV carrier without an energy dispersal waveform in order to protect MSS satellite uplinks. Previous COMSAT studies of TV interference into digital SCPC voice carriers verifies that a 2 MHz (peak-to-peak) frame rate (30 Hz) energy dispersal waveform will adequately protect the narrowband MSS voice carrier even when located in the worst spectral position of the TV signal. Thus, very modest carrier-to-interference ratios of 7 to 13 dB will adequately protect an individual MSS voice carrier against a TV signal with energy dispersal. Second, it would be helpful if ENG links could avoid illuminating the geostationary orbit with their main beam or near-in sidelobes. Third, if it were possible to standardize the location of the ENG TV carrier within the 18 MHz channel, the MSS satellite could be equipped with a notch filter to attenuate the higher energy portions of the TV carriers. For the future Project 21 type satellites, the higher transponder gains used to enable low power handheld terminals to communicate can make the satellite more susceptible to return link saturation by ENG TV carriers.

It is important for the Commission to remember in this

situation that the overlap in spectrum between MSS and Broadcast Auxiliary occurs essentially in only one of the seven channels available to Broadcast Auxiliary in the 1990-2110 MHz band. This minor overlap is illustrated in Figure 1. Therefore, COMSAT believes it is reasonable for the Commission to consider the alternative of not assigning this one channel to ENG in the future to avoid any interference difficulties with MSS.

C. MSS Sharing With MDS

Based on our initial analysis, COMSAT believes that MDS TV links at 2 GHz would not experience excessive interference from MSS satellites operating downlinks in the same bands due to the fact that there is only a 2 MHz partial overlap between the Region 2 MSS allocation at 2160-2170 MHz (downlink) and the MDS channel 2 at 2156-2162 MHz. COMSAT shows in Appendix A[14] that MDS DSB-AM vestigial sideband TV transmission could operate with only minimal interference from MSS downlinks -- even for satellites at low elevation angles. In the reverse direction, MDS transmitters could cause unacceptable levels of interference into land mobile satellite receive terminals operating in close proximity to these MDS transmitters. However, this problem can be managed through frequency planning to avoid the center of the TV carrier by 200 to 500 KHz. This avoids the higher energy

[14] See also, COMSAT Comments Gen Docket No. 89-554, Supplemental Notice of Inquiry, April 12, 1991, at 4-7.

components of the video signal and reduces interference to MSS terminals to acceptable levels. Furthermore, sharing is also facilitated by the fact that most MDS links are concentrated in urban centers, whereas the majority of land mobile terminals will operate in rural areas where terrestrial communications are not readily available.

D. MSS Sharing with Other Existing Fixed Stations

COMSAT is aware that there is a wide range of fixed terrestrial services operating at 2 GHz which may remain in these bands for some time, even though the NPRM has slated microwave fixed operations other than auxiliary broadcast and MDS services as candidates for re-location to other bands. These fixed services could impact MSS, and vice versa, if MSS operations are to be introduced in these bands prior to the re-accommodation of the fixed services to other frequency bands. However, there are various geometric factors which would make it possible for MSS to share with the fixed services on a transitional basis. These factors are explained in Appendix A.

E. MSS Sharing with Future Terrestrial PCS

Standards for Personal Communications Systems (PCS) have not yet been finalized. However, our preliminary analysis shows that PCS, as modeled by Future Public Land Mobile Telecommunication System (FPLMTS) parameters, could co-exist with MSS downlink carriers having low to medium power flux density (PFD) levels.

These PFD levels are typified by Standard M/INMARSAT-3, assuming similar type MSS carriers were to operate in the 2 GHz bands. However, if INMARSAT were to use Standard P voice carriers with a Project 21 type geostationary satellite, the PFD levels on the Earth's surface appear to exceed the maximum external interference budget that the CCIR has allocated for FPLMTS. For example, the FPLMTS external interference objectives are exceeded at ranges of: (1) about 1/3rd the maximum range for indoor personal units; and (2) 3/5ths the maximum range for outdoor personal units. These numbers indicate that there could be a considerable economic impact on the development of FPLMTS if operation is contemplated in the MSS portions of the 2 GHz bands. Thus, in order to meet the CCIR interference objective, FPLMTS systems would need to employ many more base stations, with personal stations communicating at shorter ranges. The increase in the number of base stations could upset the economies of a terrestrial PCS system. Furthermore, Canadian studies in this area show that MSS satellites sharing spectrum with FPLMTS are likely to be vulnerable to aggregate interference levels from high density FPLMTS cells in urban areas. This problem is ameliorated some what if the MSS satellite uplink beams are capable of providing sufficient discrimination against the cumulative radiation level from thousands of FPLMTS/PCS transmitters. On balance, COMSAT believes it would be in the best interest of both groups if the created separate allocations for these services.

V. NEGOTIATIONS BETWEEN INCUMBENTS AND NEW SERVICE PROVIDERS IN THE EMERGING TECHNOLOGIES BANDS SHOULD BE FLEXIBLE AND AD HOC

The Commission raises the proposition that new service providers eligible to operate in the designated emerging technologies bands might be willing to financially compensate the incumbents who need to be reaccommodated in other bands.[15] In this way, the Commission hopes to minimize the disruption to the existing 2 GHz fixed operations by providing for "flexibility in negotiations" between existing and future operators in the band. The Commission's NPRM and the OET Report discuss the many variables that must be considered in addressing the issue of costs to reaccommodate all or some of the existing 23,000 private and 7,000 common carrier operations from the 2 GHz band to other suitable frequency bands.[16] Total costs could range from

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[15] See NPRM, 7 FCC Rcd at 1542, 1544, 1545.

[16] While the prime bands considered for relocation of the 2 GHz facilities are the non-government 4 and 6 GHz bands for Fixed Satellite Service and Fixed Service, the NPRM, at paragraph 21, invited comment on the feasibility of making available a portion of the 1710-1850 MHz band now allocated to government fixed, mobile, and space operations. COMSAT believes that this band should be considered by the Commission and NTIA as a possible home for some of the 2 GHz facilities that would be displaced. However, this consideration should not be allowed to prolong a transition plan for the 2 GHz facilities. It may be feasible for government and commercial operations to share a portion of the 1710-1850 MHz band and this should be explored. In no event, however, should the Commission be deterred from expeditious action in its Rulemaking to make the 1850-2200 MHz band available for new mobile and satellite services.